Tropical Storm Paul (12W)

Tropical Storm Paul (12W) formed in early August in the southeast quadrant of a large monsoon gyre centered southeast of Okinawa and attained a maximum intensity of 50 kt on 050600Z August. This cyclone was unique in that it developed from a monsoon gyre and then merged into the gyre. During the merger period, TS Paul remained quasi-stationary for 12 hours and after the merger moved toward the Yellow Sea where it dissipated on 08 August.

JTWC issued a Tropical Cyclone Formation Alert on 020230Z August for a low-level circulation embedded in the deep convection associated with the monsoon gyre. As the circulation continued to intensify, JTWC issued the first warning on TD 12W at 031500Z August with maximum sustained winds of 25 kt.

TD 12W initially moved northwestward along the eastern periphery of the gyre (see Figure 1-12-1) and soon after reaching tropical storm intensity at 041800Z August turned westward as the cyclone merged with the monsoon gyre east of Okinawa (see Figure 1-12-2). It was during this merger period that TS Paul attained a maximum intensity of 50 kt at 050600Z August.

A review of past WESTPAC cyclones associated with monsoon gyres indicate that mergers rarely occur. The data indicates that it is much more common for a tropical cyclone to move either along the northern periphery of the gyre northeastward under the steering influence of a subtropical ridge located to the southeast, or continue westward north of the monsoon gyre. TS Paul took the least common scenario, merging with the gyre.

Another complexity noted with tropical cyclones that merge with monsoon gyres is that some of the tropical cyclones expand areally after merger and some do not. TS Paul (12W) did not expand in area after merger whereas a 1991 cyclone, TS Gladys (14W), merged with a monsoon gyre and evolved into a large tropical cyclone. The only differences noted in the synoptic and meteorological satellite data between TS Paul (1999, 12W) and TS Gladys (1991, 14W) was that TS Paul (12W) had much less associated deep convection than TS Gladys (14W). In the case of TS Gladys (14W), abundant deep convection was evident throughout the area and literally wrapped around the huge gyre. For TS Paul (12W), there was little associated convection and a large TUTT cell located over the cyclone. Thus, it appears that the TUTT may have influenced the TS Paul (12W)/monsoon gyre merger and the nonexpansion of the cyclone.

After the merger, TS Paul weakened to a tropical depression (see Figure 1-12-3) then initially moved northeastward. By 060600Z August, TS Paul had moved under the steering influence of the subtropical ridge to its north and began to track northwestward and then westward at 11 to 15 kt as a 25 kt system.

On 061800Z August TS Paul skimmed the southwest coast of Kyushu as a 25 kt system and the Japan Meteorological Agency reported that associated rainfall caused damage from landslides and floods in western Japan. TS Paul subsequently dissipated over water in the Yellow Sea and JTWC issued the 19th and final warning at 080300Z August.

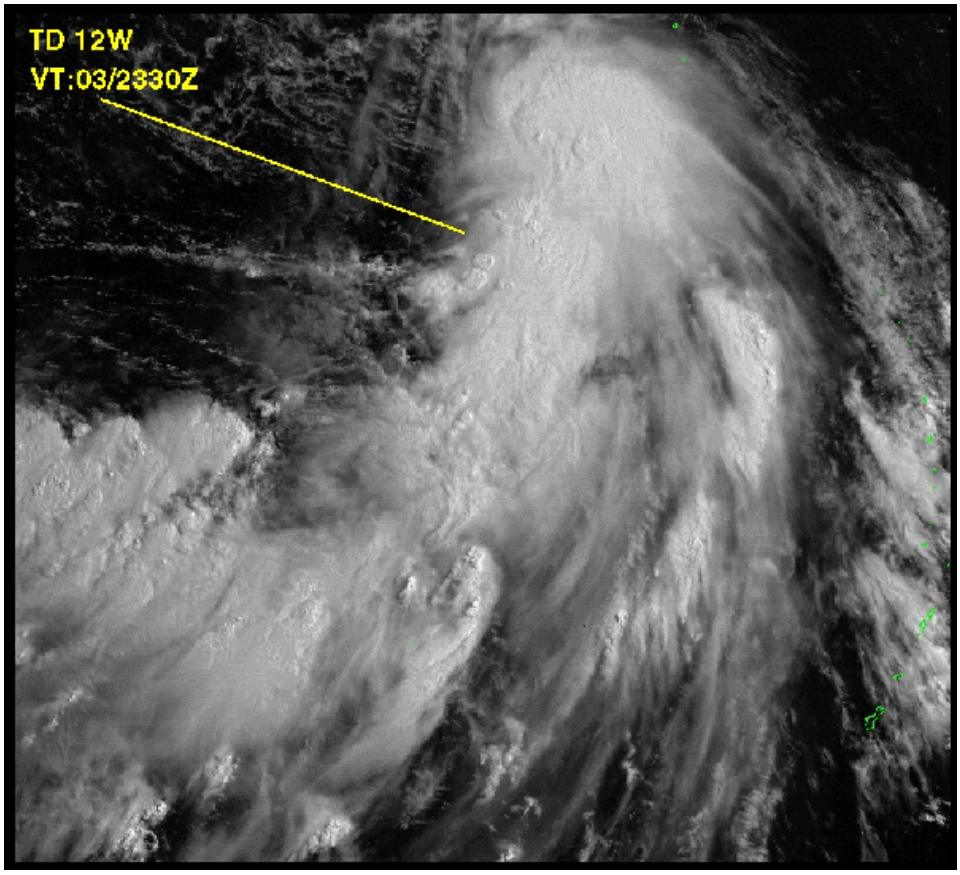


Figure 1-12-1. A visible satellite image showing TD 12W embedded within the southeast quadrant of a monsoon gyre centered southeast of Okinawa.

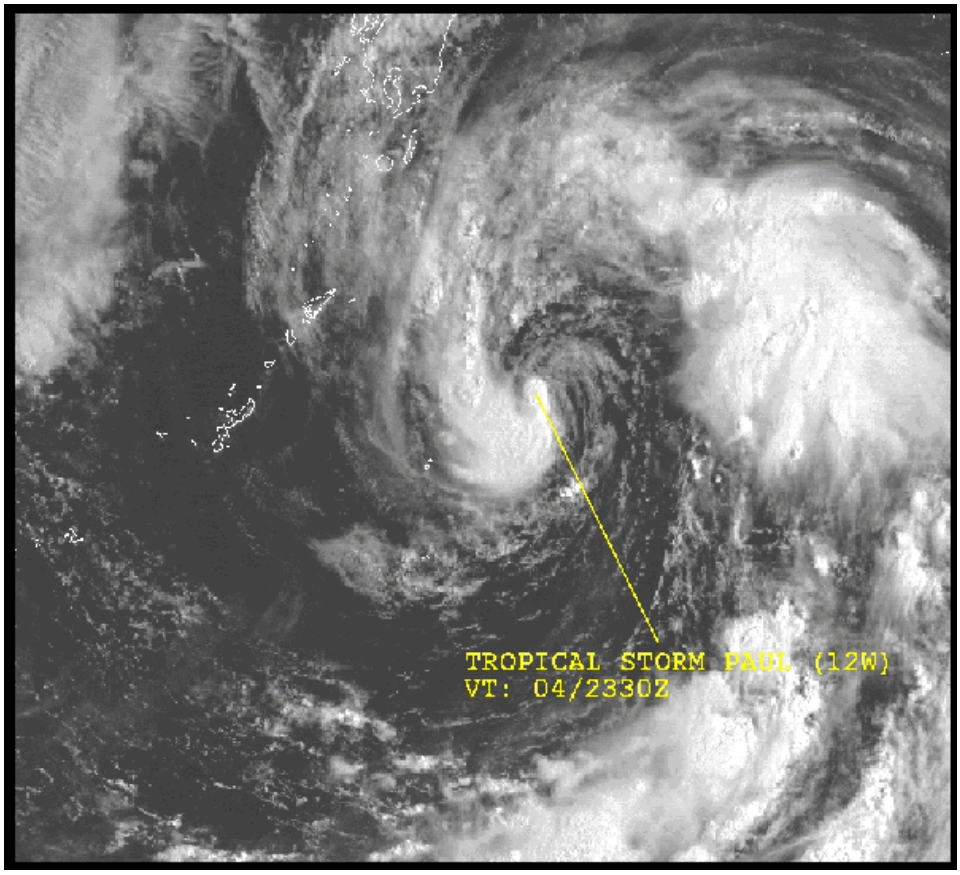


Figure 1-12-2. A visible satellite image of TS Paul (12W) just after it merged with the monsoon gyre east of Okinawa.

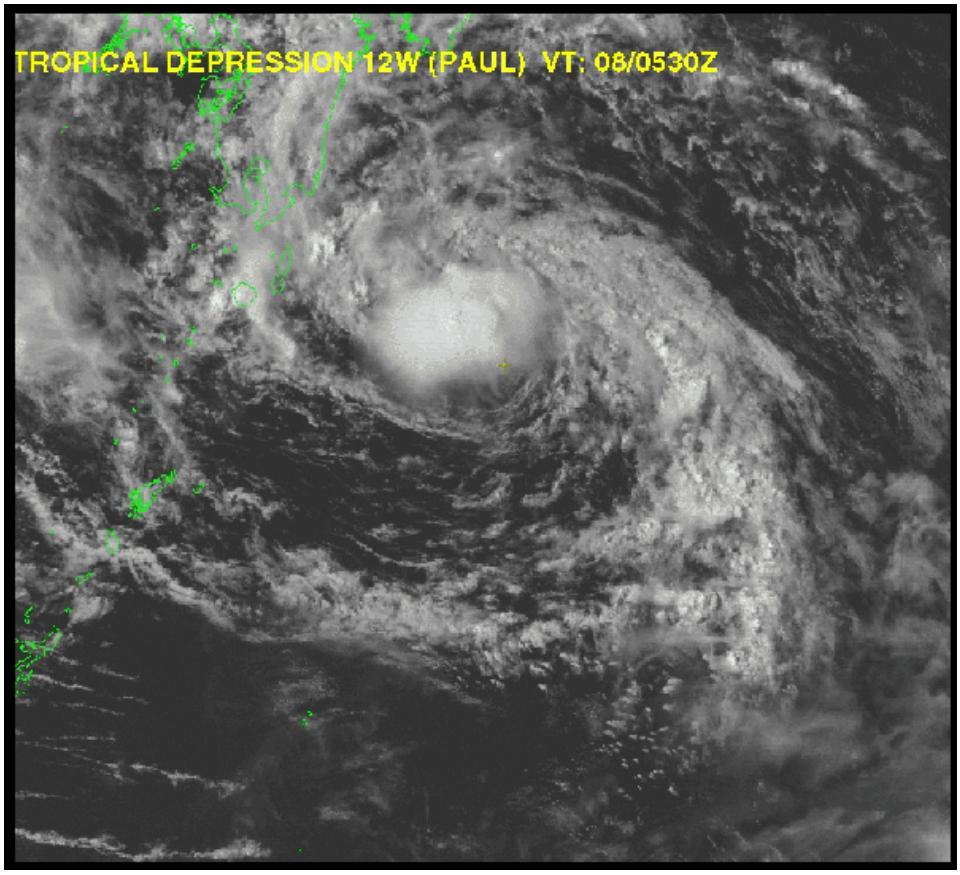
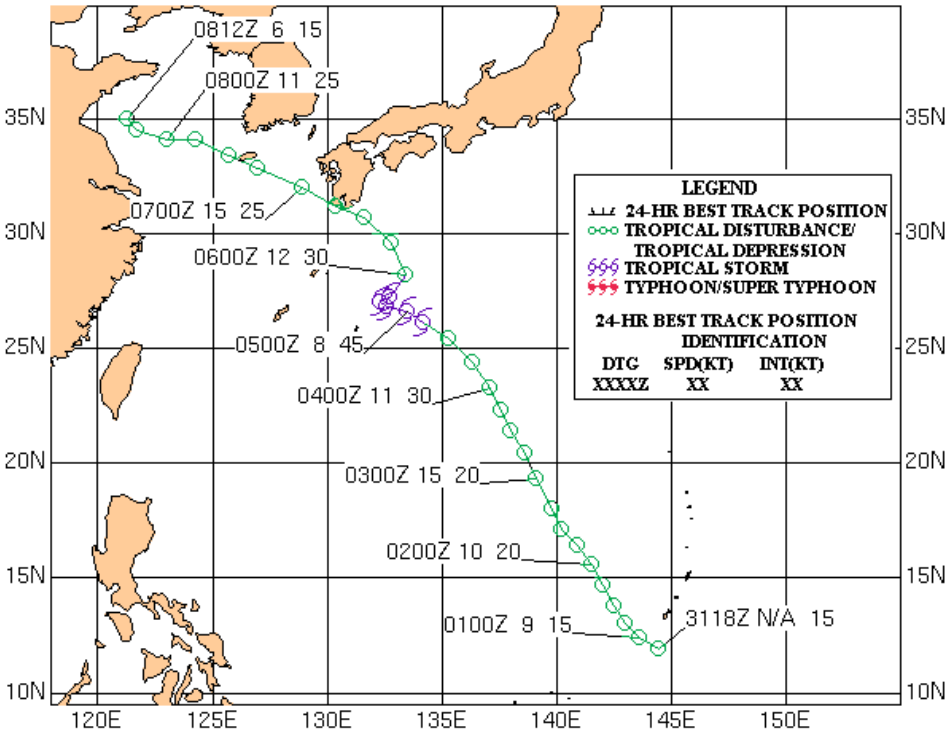


Figure 1-12-3. A visible satellite image of TD 12W (Paul) six hours after it merged with the monsoon gyre. The monsoon gyre itself collapsed around TD 12W (Paul) and together they became a large depression which moved off to the northwest.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0800Z 11 25
0700Z 15 25
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0500Z 8 45
0400Z 11 30
0300Z 15 20
0200Z 10 20
0100Z 9 15
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35N
30N
25N
20N
15N
10N
120E
125E
130E
135E
140E
145E
150E
LEGEND
24-HR BEST TRACK POSITION
TROPICAL DISTURBANCE/ TROPICAL DEPRESSION
TROPICAL STORM
TYPHOON/SUPER TYPHOON
24-HR BEST TRACK POSITION IDENTIFICATION
DTG SPD(KT) INT(KT)
XXXXZ XX XX